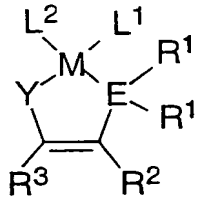
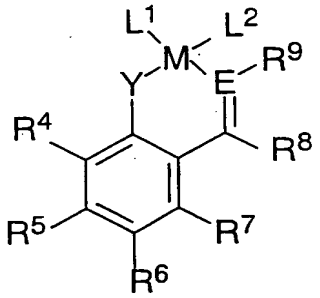
We claim:

1. A process for emulsion polymerizing one or more olefins by reacting the olefins with a complex compound of the formula Ia or Ib or with a mixture of the complex compounds Ia and Ib



Ia



Ib

where:

M is a transition metal from groups 7 to 10 of the Periodic Table of the Elements;

L^1 is phosphines $(R^{16})_xPH_{3-x}$ or amines $(R^{16})_xNH_{3-x}$ with identical or different radicals R^{16}, ethers $(R^{16})_2O$, H_2O, alcohols $(R^{16})OH$, pyridine, pyridine derivatives of the formula $C_5H_{5-x}(R^{16})_xN$, CO, C_1-C_{12} alkylnitriles, C_6-C_{14} arylnitriles or ethylenically unsaturated double bond systems, x being an integer from 0 to 3,

L^2 is halide ions, amide ions R_hNH_{2-h}, h being an integer from 0 to 2, and also C_1-C_6 alkyl anions, allyl anions, benzyl anions or aryl anions, it being possible for L^1 and L^2 to be linked to one another by one or more covalent bonds,

E is nitrogen, phosphorus, arsenic or antimony,

X is $-SO_3^-$, $-O-PO_3^{2-}$, $NH(R^{15})_2^+$, $N(R^{15})_3^+$ or $-(OCH_2CH_2)_nOH$, and

n is an integer from 0 to 15,

Y is oxygen, sulfur, $N-R^{10}$ or $P-R^{10}$,

R^1 is hydrogen, C_1-C_{12} alkyl groups, C_7-C_{13} aralkyl radicals and C_6-C_{14} aryl groups, unsubstituted or substituted by a hydrophilic group X,

R^2 and R^3 are hydrogen,
hydrophilic groups X,
C_1-C_{12} alkyl, it being possible for the alkyl groups to be branched or unbranched,
C_1-C_{12} alkyl substituted one or more times by identical or different substituents comprising C_1-C_{12} alkyl groups, halogens, hydrophilic groups X, C_1-C_{12} alkoxy

groups or C_1-C_{12} thioether groups,
C_7-C_{13} aralkyl,
C_3-C_{12} cycloalkyl,
C_3-C_{12} cycloalkyl substituted one or more times by identical or different substituents comprising C_1-C_{12} alkyl groups, halogens, hydrophilic groups X, C_1-C_{12} alkoxy groups or C_1-C_{12} thioether groups,
C_6-C_{14} aryl,
C_6-C_{14} aryl substituted one or more times by identical or different substituents comprising C_1-C_{12} alkyl groups, halogens, hydrophilic groups X, monohalogenated or polyhalogenated C_1-C_{12} alkyl groups, C_1-C_{12} alkoxy groups, silyloxy groups $OSiR^{10}R^{11}R^{12}$, amino groups $NR^{13}R^{14}$ or C_1-C_{12} thioether groups,
C_1-C_{12} alkoxy groups,
silyloxy groups $OSiR^{10}R^{11}R^{12}$,
halogens
or amino groups $NR^{13}R^{14}$,
it being possible for the radicals R^2 and R^3 together to form a saturated or unsaturated 5- to 8-membered ring, and
at least one radical R^1, R^2 or R^3 carrying a hydrophilic group X;

R^4 to R^7 are hydrogen,
hydrophilic groups X,
C_1-C_{12} alkyl, it being possible for the alkyl groups to be branched or unbranched,
C_1-C_{12} alkyl, substituted one or more times by identical or different substituents comprising C_1-C_{12} alkyl groups, halogens, hydrophilic groups X, C_1-C_{12} alkoxy groups or C_1-C_{12} thioether groups,
C_7-C_{13} aralkyl,
C_3-C_{12} cycloalkyl,
C_3-C_{12} cycloalkyl substituted one or more times by identical or different substituents comprising C_1-C_{12} alkyl groups, halogens, hydrophilic groups X, C_1-C_{12} alkoxy groups or C_1-C_{12} thioether groups,
C_6-C_{14} aryl,
C_6-C_{14} aryl substituted one or more times by identical or different substituents comprising C_1-C_{12} alkyl groups, halogens, hydrophilic groups X, monohalogenated or polyhalogenated C_1-C_{12} alkyl groups, C_1-C_{12} alkoxy groups, silyloxy groups $OSiR^{10}R^{11}R^{12}$, amino groups $NR^{13}R^{14}$ or C_1-C_{12} thioether groups,
C_1-C_{12} alkoxy groups,
silyloxy groups $OSiR^{10}R^{11}R^{12}$,

halogens,
NO_2 groups
or amino groups $NR^{13}R^{14}$,

it being possible for pairs of adjacent radicals R^4 to R^7 together to form a saturated or unsaturated 5-8-membered ring,

R^8 and R^9 are hydrogen, C_1-C_6 alkyl groups, C_7-C_{13} aralkyl radicals and C_6-C_{14} aryl groups, unsubstituted or substituted by a hydrophilic group X,

R^{10} to R^{15} are selected independently of one another from hydrogen, C_1-C_{20} alkyl groups, which may be substituted in turn by $O(C_1$-C_6 alkyl) or $N(C_1$-C_6 alkyl)$_2$ groups, or are C_3-C_{12} cycloalkyl groups, C_7-C_{13} aralkyl radicals and C_6-C_{14} aryl groups;

R^{16} is hydrogen, C_1-C_{20} alkyl groups, which may in turn be substituted by $O(C_1$-C_6 alkyl) or $N(C_1$-C_6 alkyl)$_2$ groups, or is C_3-C_{12} cycloalkyl groups, C_7-C_{13} aralkyl radicals and C_6-C_{14} aryl groups unsubstituted or substituted by a hydrophilic group X,

in water or in a solvent mixture containing at least 50% by volume of water, optionally in the presence of an activator and an emulsifier.

2. A process as claimed in claim 1 with complex compounds of the formula Ib in which at least one radical R^4 to R^9 carries a hydrophilic group X.

3. A process as claimed in claim 1 or 2 by reacting the olefin with at least one electrically neutral nickel complex compound of the formula Ia or Ib.

4. A process as claimed in any of claims 1 to 3, wherein the activator comprises olefin complexes of rhodium or of nickel.

5. A process as claimed in any of claims 1 to 4 in the presence of an emulsifier.

6. A process as claimed in any of claims 1 to 5 wherein one of the olefins is ethylene.

7. A process as claimed in any of claims 1 to 5, wherein one olefin is ethylene and the comonomer is selected from propylene, 1-butene, 1-hexene and styrene.

8. A process as claimed in any of claims 1 to 5, wherein one olefin is ethylene and the comonomer is selected from norbornene, norbornadiene and cis- and trans-2-butene.

9. A dispersion of polyethylene or ethylene copolymers in water obtainable as claimed in any of claims 1 to 8.

10. The use of an aqueous polyethylene dispersion as claimed in claim 9 for paper applications such as paper coating or surface sizing, paints, adhesive base materials, molded foams such as mattresses, textile and leather applications, carpet back coatings or pharmaceutical applications.

11. A paper size or colored paper coating slip comprising a dispersion as claimed in claim 9.

12. A paint comprising a dispersion as claimed in claim 9.

13. An adhesive base material comprising a dispersion as claimed in claim 9.

14. A molded foam or mattress produced from a dispersion as claimed in claim 9.

15. A textile or leather application comprising a dispersion as claimed in claim 9.

16. A carpet back coating comprising a dispersion as claimed in claim 9.

17. A pharmaceutical preparation comprising a dispersion as claimed in claim 9.